REMARKS

The Examiner is thanked for the due consideration given the application.

Claims 1-16 are pending in the application. Acknowledgement of the allowability of claims 2-16 is noted with appreciation. The claims have been amended to improve their language in a non-narrowing fashion.

No new matter is believed to be added to the application by this amendment.

Objections To The Claims

The claims have been objected to as containing informalities. The claims have been amended to be free from informalities.

Rejection Over SELVAGANAPATHY et al.

Claims 1 and 2 have been rejected under 35 USC §102(e) as being anticipated by SELVAGANAPATHY et al. (U.S. Patent 7,125,478). This rejection is respectfully traversed.

The present invention pertains to an electrophoretic system with protection for its detectors that is illustrated, by way of example, in Figure 1 of the application, which is illustrated below.

Fig 1

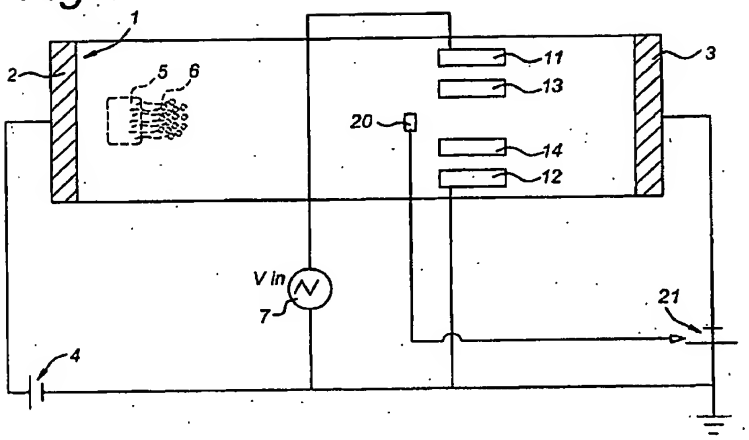

Figure 1 illustrates four detection electrodes 11, 12, 13, 14 and a DC source 4 between separation electrodes 2, 3. An AC voltage source 7 is connected between electrodes 11 and 12. A sensor 20 inputs to extra DC voltage source 21, which is between electrode 3 and ground.

Claim 1 of the present invention recites: "the electrophoretic system comprises means to reduce a voltage difference between the separation system and the detection system in order to prevent electrical breakthrough between the separation system and the detection system, where said means to reduce said voltage difference comprises a DC-voltage source."

SELVAGANAPATHY et al. fail to disclose at least this feature of the present invention.

SELVAGANAPATHY et al. describe a microscale electrophoretic system. The Official Action refers to column 13, lines 10-45 and Figure 4 (reproduced below) of SELVAGANAPATHY

et al., and asserts that this describes an important feature of the claimed invention.

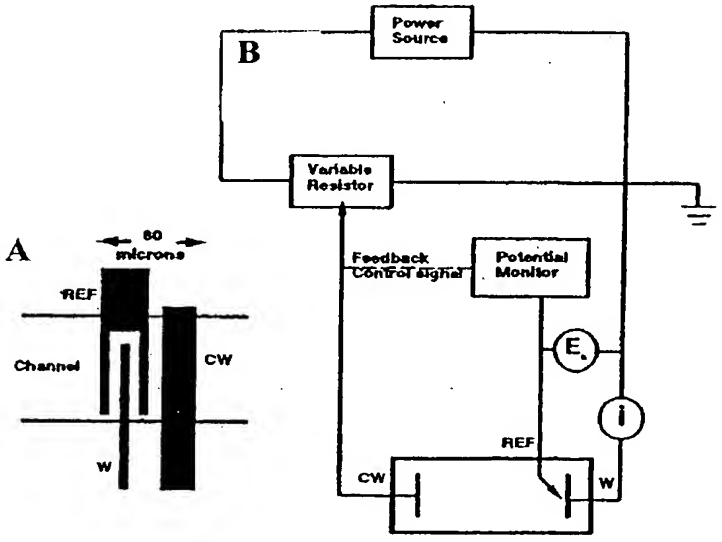

Figure 4 of Selvaganapathy et al.

SELVAGANAPATHY et al. describe a system which includes an on-chip channel configuration and an electronic detector. The detector presented is a state-of-the-art three-electrode configuration for potentiostatic detection. This type of detector is known in classical CE-systems.

The electrodes used are used for the detection of the different ionic-zones. There are no electrodes present for any potential compensation with the goal to protect the detector and/or to prevent gas generation at the detector.

The three electrodes are referred to as a reference electrode, a working electrode and a counter electrode. The detection principle is based on a current which is flowing from the working electrode to the counter electrode. Due to the

conductivity of the sample-liquid, a voltage difference is present between the working electrode and the counter electrode. This voltage difference is sensed by the reference electrode. The reference electrode can be used to control the voltage of the detector itself. However, it is not used to determine or to control the potential of the total detector system.

In SELVAGANAPATHY et al. at column 13, line 28 *et seq.*, technology is described which is used when the detector is at a potential, not equal to ground, due to its position in the separation channel: the detector system is left electrically floating.

Column 13, lines 36-38 of SELVAGANAPATHY et al. also discusses that the detection system is decoupled from the separation system: "*This decouples the electrophoresis and detection systems and the electrodes float with the solution potential.*"

This approach is mentioned at page 3, lines 1-3 of the specification of the present application, and this technology has drawbacks as mentioned in the present application:

- Due to parasitics there will be a net current flow through the detector system. This will cause gas-generation and measurement errors.
- The detector system is electrically floating which makes it difficult to interface with other system components (e.g. isolation stages are required).

It should be noted that the chemical detector of the present invention is not claimed, and it is only used as an example of which kind of detector could be used with our system.

In comparison, the system according to SELVAGANAPATHY et al. is not intended or suitable for actively protecting the detector. The DC-source mentioned in SELVAGANAPATHY et al. is solely present for the chemical detection and not for protection.

Thus, SELVAGANAPATHY et al. fail to disclose or suggest "means to reduce a voltage difference between the separation system and the detection system in order to prevent electrical breakthrough between the separation system and the detection system, where said means to reduce said voltage difference comprises a DC-voltage source." (see claim 1).

SELVAGANAPATHY et al. accordingly fail to anticipate claims 1 and 2 of the present invention.

This rejection is believed to be overcome, and withdrawal thereof is respectfully requested.

Rejection Over VIRTANEN et al.

Claim 1 has been rejected under 35 USC §102(b) as being anticipated by VIRTANEN et al. (U.S. Patent 3,649,499). This rejection is respectfully traversed.

VIRTANEN et al. pertain to a method for establishing the zone occurring in electrophoresis and for their quantitative determination. Columns 2 and 3 of VIRTANEN et al. describe how measurements are made. Vessel D is grounded. The resistance of

vessel D is schematically represented in Figure 3 (reproduced below) by resistance RD. The left and right capillaries K and K' are represented in Figure 3 by RK and RK'. A separation voltage is applied to points B and B'.

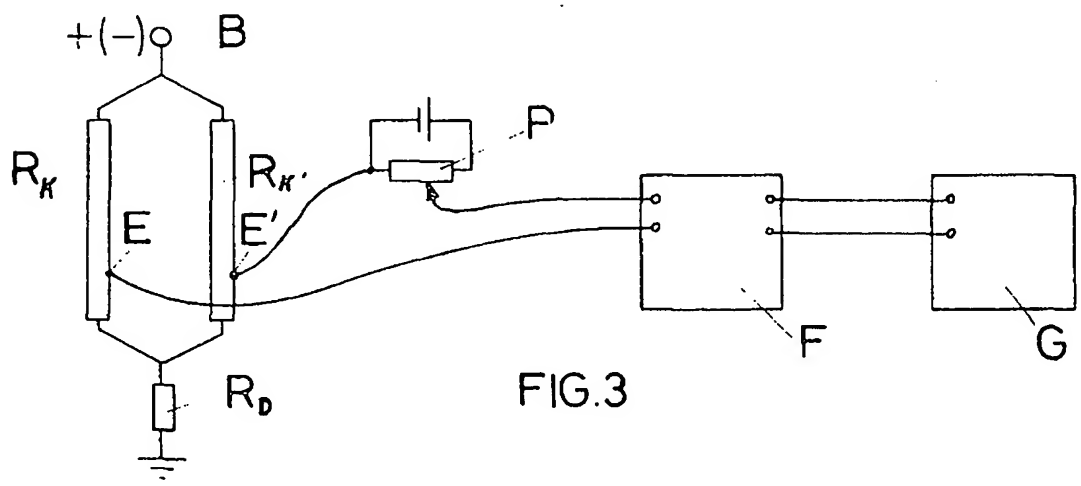

FIG.3

Points E and E' in Figure 3 of VIRTANEN et al. are the measurement points. The potentials at points E and E' are equal. As long as the conditions are similar in the left and right capillary, the potential at points E and E' remains constant and equal with respect to each other.

A solution is introduced in the left capillary K which travels under influence of a separation voltage applied to point B (and B'). When the solution passes point E, a potential difference arises between points E and E'. These fluctuations are measured.

The main purpose of the right capillary is to provide a reference signal. The fluctuations measured at E are relatively

small and a known strategy for measuring small fluctuations of a high DC value is to compare them with a similar DC value that does not fluctuate. This reference measurement signal is provided at E'.

The embodiment shown in Figure 4 of VIRTANEN et al. (reproduced below) illustrates a similar set-up.

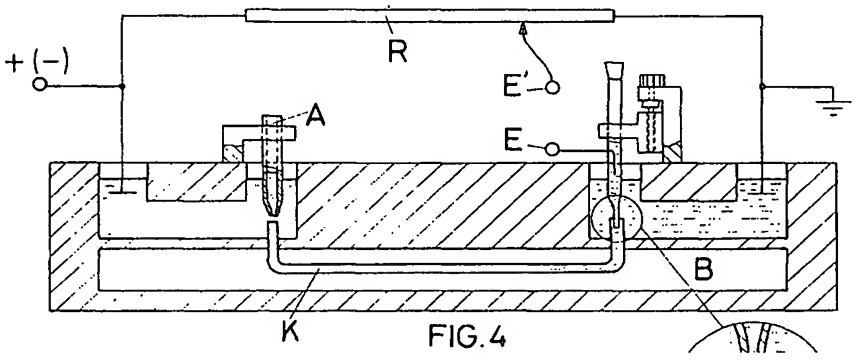

FIG.4

In Figure 4 of VIRTANEN et al., only the right capillary K' has been replaced with a resistance R. This resistance R is adjustable in order to tune the potential at E and E' to be equal before measurement.

It must be noted that the resistance R in Figure 4 of VIRTANEN et al. has only been provided in order to achieve a potential E' that can be compared with E. The fluctuations at E can be measured more accurately if they are compared with a similar signal that does not fluctuate (point E'). Thus, points E and E' are the measurement points and neither one of them operates as a compensation electrode to provide a compensation voltage to prevent breakthrough.

VIRTANEN et al. fail to describe an electrophoretic system that can compensate to prevent electrical breakthrough between the separation system and the detection system, such as is set forth in claim 1 of the present invention.

VIRTANEN et al. thus fail to anticipate claim 1 of the present invention.

The rejection is believed to be overcome, and withdrawal thereof is respectfully requested.

Rejection Over HUANG et al.

Claim 1 has been rejected under 35 USC §102(b) as being anticipated by HUANG et al. (EP 0475713 A1). This rejection is respectfully traversed.

HUANG et al. describe an electrophoresis apparatus in relation to the problem of preventing the high separation potentials used from interfering with the detection process.

However, HUANG et al. fail to disclose a "means to reduce a voltage difference between the separation system and the detection system in order to prevent electrical breakthrough between the separation system and the detection system, where said means to reduce said voltage difference comprises a DC-voltage source 21," as claimed in claim 1 of the present invention.

HUANG et al. do describe a potentiostat (570) (See Figure 5, reproduced below).

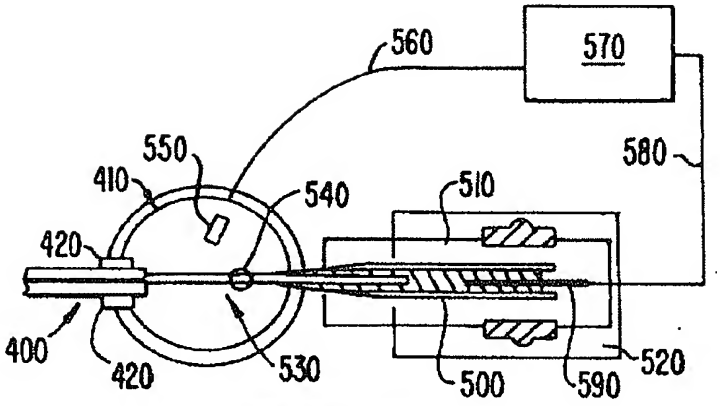

FIG. 5.

HUANG et al. fail to describe how this potentiostat is used. However, the potentiostat is clearly part of the readout system. The potentiostat fails to provide any means to cancel out a voltage difference between the detector and the separation channel in order to protect the detector. Due to the nature of the system, no protective measures are necessary. However, the placement of the detector in the system is limited to one specific position.

Moreover, HUANG et al. describe a reference electrode (550). However, the reference electrode (550) is analogous to part of the detection system as used in SELVAGANAPATHY et al. The function of reference electrode (550) may be roughly comparable with the function of electrodes 11 and 12 of the application. Reference electrode (550) is not used as a compensation electrode.

HUANG et al. thus fail to disclose or suggest the invention of claim 1 of the present invention. In fact, HUANG et al. seem to point in a different direction, because they describe an alternative solution for solving the problem of preventing the high separation potentials used from interfering with the detection process. HUANG et al. thus teach away from the present invention.

Further, column 2, lines 48-50 of HUANG et al. states: "They [the "end-column detectors"] do not suffer from electrical interference caused by the applied high voltage during the CZE separation." Column 7, lines 33-37 of HUANG et al. states: "With the inventive end-column amperometric detector, there is no need to isolate the sensing electrode from the high electric field needed for electrophoresis because the voltage drop outside the bore of the capillary is negligible." So, in the set-up of HUANG et al. there is apparently no risk of breakthrough at all.

In HUANG et al., no compensation is present, since there is no need for it. HUANG et al. teach to solve the problem of interference between the separation system and the detection system by providing an end-column detector. The application solves the problem in an alternative way by providing a solution that allows the detection system to be positioned at any position alongside the column.

HUANG et al. also describe an electrophoresis apparatus, but does not disclose the technical features described in claim 1.

Additionally, the solution according to HUANG et al. can only be applied with a limited range of detector types and cannot be used in combination with, e.g., a (contactless) four electrode conductivity detector, which is preferably used in the system of the present invention.

As a result, HUANG et al. fail to anticipate claim 1 of the present invention.

Conclusion

The applicant is working to resolve issues pertaining to priority and the submission of references.

The Examiner is thanked for considering the Information Disclosure Statement filed December 13, 2004 and for making an initialed PTO-1449 Form of record in the application. It is noted that the citations of BASTEMEIJER et al. and PARK et al. have been crossed through.

The rejections have been overcome, obviated or rendered moot. The Examiner is accordingly respectfully requested to place the application in condition for allowance and to issue a Notice of Allowability.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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